

Adapting Existing Structures to Deep-bedded Systems (Session 2D)

PRESENTERS: Dan Meyer, ISU Extension agricultural engineer, Northeast Area; Jeff D. Hill, Murphy Family Farms, Algona

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Dan Meyer: The problem with renovating old tall barns or machinery sheds into swine structures is that there is too much air volume. It costs too much to heat that much air. These situations usually result in a high mortality rate because pigs suffocate from piling to keep themselves warm.

That problem can be solved by creating an artificial "hay loft" that acts as a lower false ceiling. This false ceiling entrains the heat at animals' level. The resulting warm area encourages pigs to make their sleeping area under the loft and dung outside the sleeping area.

Artificial hay lofts or false ceilings can be made from 2x6 lumber on 4-ft. centers that support a wire mesh hog panel fence. The fence then supports a 4-inch thick layer of straw that holds heat but lets moisture pass through it. Instead of 2x6 lumber, wooden poles on 8-ft. centers also have been used by one producer. Buildings converted in this way can be operated in very cold outdoor temperatures.

At the entrance to the area covered by the loft, provide a curtain made from woven poly-tarp or plywood. This curtain also traps heat and encourages pigs to sleep under the loft. More details about this construction are available from an ISU Extension fact sheet, Improving Winter

Environments in Open-ceiling Buildings for Pigs, Pm-1760, October 1998.

Other considerations:

- Place the artificial hay loft approximately 7 ft. above the floor to allow for cleaning by skid steer loaders. The loft should cover a sleeping area that has at least 5 square ft. per finishing pig, or 10 square ft. of sleeping area per sow. Use plenty of bedding and bed only the sleeping area. The outside walls should be insulated, if possible.
- Pour concrete floors at a slope of 1/4-in. per ft. so that urine waste can be removed.
- Costs are about \$11/pig for construction of a false ceiling and gating. This cost includes the cost of gating. The slide photograph example that Meyer provided during the session included feeding equipment. The feeding equipment cost the producer in the example an additional \$14 per pig.
- For ventilation, remember that air currents tend to move from east to west in a building. The size of the ridge vent in a barn roof should be 5 square inches per pig, or about a 2-inch ridge width for every 10 ft. of building width.

For supplemental ventilation on buildings

up to 28 ft. deep, use 1600 cfm fans on the ends of 12-inch diameter PVC pipe. The pipe acts as a duct. Place pipes on 32-ft. centers. On the pipe itself, provide 3-inch diameter holes on 12-inch centers. Allow 15 cfm per pig. For ventilation on buildings up to 48 ft. deep, use 2400 cfm fans on the ends of 15-inch diameter pipes. Refer to ISU Extension fact sheet, Supplemental Ventilation on Modified Open Front Finishers, Pm-1761, for more details.

- Reducing temperature to about 65° F for larger pigs can control ammonia levels. As a goal, keep ammonia below 25 ppm.

Jeff Hill discussed how turkey barns and shallow-pit, pull-plug liquid manure confinement systems can be renovated for use with deep-bedded swine production.

In 1996, Murphy Family Farms had 2,300 head in buildings that had been renovated for deep-bedded swine production. In 1998, the company renovated additional buildings to achieve a 20,000-head capacity in deep bedding. Renovated buildings range from 250 to 700 ft. long.

Two turns per year are scheduled in renovated buildings. The turns are scheduled so they do not interfere with crop planting or harvest seasons. The capacity is based on 15-16 sq. ft. per finishing pig because it's easier to manage bedding, which is added about once a week.

All renovated buildings use a single pen design. It is not uncommon to have 600 to 2,000 head in a one-pen building. Buildings are cleaned only once every two turns, or about once per year. The average manure pack depth at cleanout is 22 in.

Hill suggested that existing feed delivery systems should be used, if possible. On

Murphy Farms facilities, tandem bins are used, although they have gone to wet/dry feeders in deep-bed facilities. The feeders are mounted on floating platforms made from 2-inch solid native Iowa oak planks that can be raised as more bedding is brought in. Feed tubes above feeders adjust to accommodate the variable platform height.

To control heat and humidity in the summer, Murphy Farms uses an automatic misting/cooling system. Systems are set to run 1 minute every 10 minutes. For supplemental heat in the winter for young pigs, Murphy Farms uses the existing brooder heaters installed in the turkey buildings.

A 4-ft. controlled curtain provides supplemental ventilation, with circulation fans used to only stir and mix air. Side walls in the buildings are replaced with solid native Iowa oak boards or planks that extend 30 inches above the floor and support wire hog panels. The curtains hang above the hog panels.

Most of the turkey facilities used for deep bedding are pole barns. Pole barn posts should be wrapped in tin to prevent the pigs from chewing on them.

The company allocated \$15 per pig space for renovation, but the actual cost ranges from \$8 to \$16.25.

Hill offered these tips for operation of renovated buildings for deep-bedded systems:

- If the building has a dirt floor, use a lime base pack underneath the bedding.
- Start with a clean building and 14 inches of fresh bedding. Bales can be left intact in a row down the center of the building to

encourage pig socialization.

- There is no need to exceed 22 inches of loose bedding. Pigs seem to stop burrowing after they've gone 6 to 8 inches deep, provided they have not found anything "new" to burrow into.
- Expect to use approximately 200 lb. of corn stalk bedding per pig. About 100 acres of corn is needed to produce enough bedding. (Note: The speaker did not say how many pigs this applied to. However, it is the recorder's best estimate that 100 acres should supply enough bedding for 2,000 pigs assuming 2 tons of cornstalks are harvested per acre. The amount of cornstalks harvested from any given acre depends on the residue requirements for soil conservation compliance.)
- If there is enough room, [recorder assumes room for burrowing], pigs should be able to be placed in building at 50° F. (Note: The speaker did not clearly specify whether he meant "room" for burrowing or "room" as in square feet of area per pig.)
- Allocate 60 percent of total space as a lying area and 25 percent as a dunging area. The dunging area can be kept along the sidewall by strategically placing heaters over the bedded space, and a misting system over the scrap alley. Maintain bedding pack all year long.
- For animal handling, use a portable load-out tub with a double-holding pen capacity. The sort pen should be no wider than 8 ft. With this system, Murphy Farms usually can load a semi-truck in less than 45 minutes. The record time to load a 180-pig truck was 22 minutes. Also with this loading system, trim loss and bruising has gone down.

- Pigs can be vaccinated as they come in off the truck count. Murphy Farms can do 2,000 pigs this way in just under 2 hours.

According to Hill, these systems have had generally excellent animal performance. They have not yet broken 2.0 on rate of daily gain, but that's a goal. Hill said Murphy's feed conversion for deep-bedded pigs in renovated buildings has been competitive to slightly better than their confinement pigs. Feed for deep-bedded pigs can have a lower energy ration.

Bedding management is the key to deep-bedding systems. Bedding must be added weekly, and managers must have a bedding plan. Straw bedding can be used, as well as some shredded newspaper; each has advantages and disadvantages.

Hill suggested that 6 to 8 inches of fresh bedding should be placed on top of the previous turn's bedding before the second turn of pigs is added to the building. To prevent problems with rats in the bedding, keep the feeding area clean and stockpile bedding at least 50 ft. away from the building. The average N-P-K analysis is 20-20-20 for manure that comes from Murphy Farm's deep-bedding systems.

The advantages of renovating a building for deep-bedding systems include:

- the use of an existing resource,
- reduced environmental concerns
- possible improved public perception, and
- happy pigs.

Deep-bedding systems are a low-cost alternative. Herdsmanship is still very important! Don't try to make it a cheap system. Use good gating and load-out systems.